

Evidence- and Consensus-Based **Digital Healthcare Equity Framework**

A PRACTICAL GUIDE FOR IMPLEMENTATION



The advancement of digital healthcare technologies has resulted in many viable solutions that can improve healthcare delivery and outcomes. But all too often, the designers and implementers of these technologies have not intentionally considered the unique needs and capabilities of all applicable patient groups. Omitting equity considerations throughout the lifecycle of digital healthcare technologies can create new or exacerbate existing healthcare disparities.

This guide offers technology developers, health plans, and healthcare providers a step-by-step path for implementing the [Evidence- and Consensus-Based Digital Healthcare Equity Framework](#) so they can intentionally consider equity across all phases of the digital healthcare lifecycle for patient-facing and clinician-facing healthcare solutions involving digital technologies.

➤ GETTING STARTED!

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What's the Problem?

The use of digital technologies in healthcare delivery is growing, including both patient-facing and clinician-facing solutions.

Despite the considerable opportunities that digital healthcare technologies provide to reduce healthcare inequities, substantial disparities due to race, ethnicity, and socioeconomic status still exist in access to and use of healthcare services.¹⁻³ The positive impact of digital technologies on individual and population health will be limited if the unique characteristics, needs, and capabilities of all patient groups are not considered at each phase of the digital healthcare lifecycle.

Considerations ranging from a lack of patient digital literacy to a lack of broadband access, collectively referred to as the “digital divide,” may impact the viability of healthcare solutions that involve digital technologies and tools.⁴⁻⁶ Addressing the “digital divide” and its impact on the health of individuals and communities requires an approach that intentionally considers equity throughout the lifecycle of digital healthcare solutions. This systematic approach is essential to achieve digital healthcare equity.

A digital healthcare equity approach will help us move from a superficial description of factors to an ecologically comprehensive approach that considers the multitude of sociodemographic, cultural, and economic factors and their interactions that impact health and well-being.^{7,8}

The positive impact of digital technologies on individual and population health will be limited if the unique characteristics, needs, and capabilities of all patient groups are not considered at each phase of the digital healthcare lifecycle.

COVID-19 VACCINATION SIGNUP: “DIGITAL DIVIDE” CREATES INEQUITIES



A digital healthcare equity approach acknowledges that to ensure equity, different populations may necessitate different solutions.

For example, many initial solutions used for COVID-19 vaccination signup relied on internet access and a familiarity with digital forms, which was a disadvantage for those who lacked the requisite capabilities. These barriers created inequities in which patient subgroups had earliest access to the COVID-19 vaccine.

Entities planning, developing, or implementing such a solution need to be intentional in thinking about equity and ensuring there are viable alternatives available (e.g., offering a phone number to make vaccine appointments) for those who lack the capabilities to use an online solution.

About the Framework

The [Evidence- and Consensus-Based Digital Healthcare Equity Framework](#) (**Figure 1**) guides users in intentionally considering equity in healthcare solutions that involve digital technologies. The framework serves as a tool to help users and other stakeholders assess whether healthcare solutions that involve digital technologies are equitable at every phase of the digital healthcare lifecycle.

The intended users of this framework include digital healthcare developers and vendors, health systems, health plans, and clinical providers. While the users of this framework are likely a subset of all key stakeholders, the framework specifically calls for engaging all listed stakeholders as part of ensuring equity intentionality.

Six principles guided the development of the framework. These principles included:

- Ensure digital healthcare solutions that involve digital technologies ameliorate, not exacerbate, inequities.
- Represent equity through person-centeredness.
- Encourage inclusivity and participatory creation of digital healthcare solutions.
- Support effective implementation in diverse settings.
- Ensure specific attention to policy/regulatory relevance or impact of the proposed solutions.
- Focus on impact and outcomes for patients, health systems, and communities.

The framework is designed with two primary aims: 1) to improve patient outcomes and 2) to advance healthcare equity.

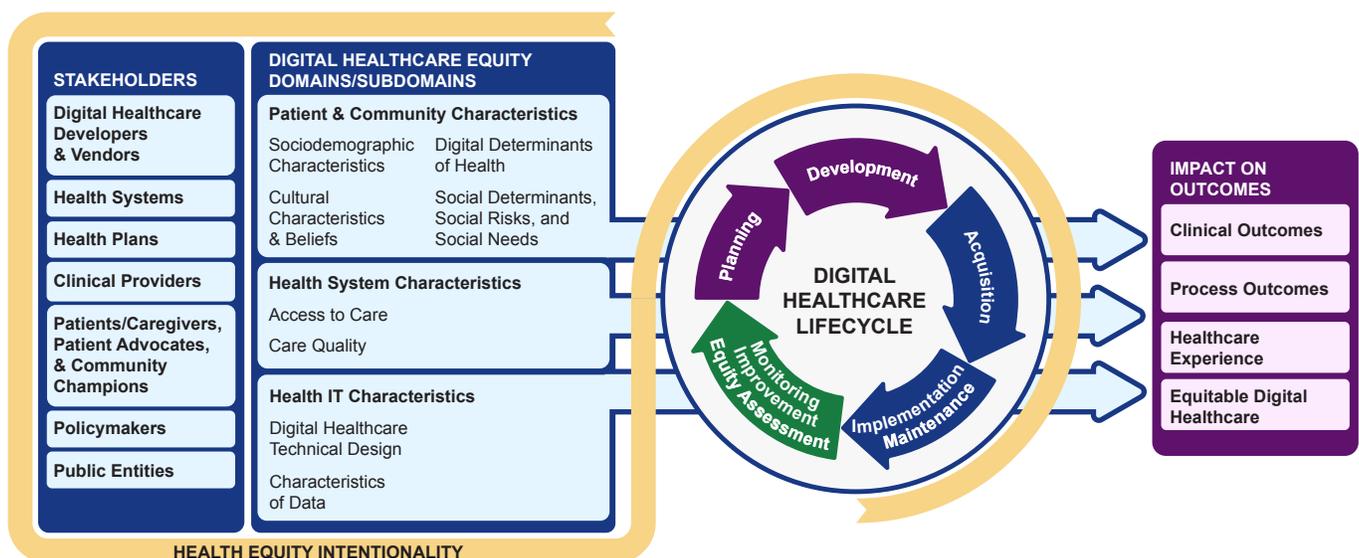


Figure 1. Evidence- and Consensus-Based Digital Healthcare Equity Framework for Assessing and Advancing Equity for Healthcare Solutions that Involve Digital Technologies.

Components of the Framework

The framework’s domains and subdomains were derived from synthesizing concepts identified from a [scoping review](#), [key informant interviews](#), and input from a 30-person [technical expert panel](#). **Figure 2** describes each of the three domains and provides key examples of each subdomain.

Digital Healthcare Equity Domains and Subdomains

| Domains | Subdomains |
|---|--|
|  <p>Patient and Community Characteristics Including patient-level characteristics, community-based characteristics, and factors representing the interactions between the two.</p> | <ul style="list-style-type: none"> • Sociodemographic Characteristic (e.g. race and ethnicity, primary language, sexual orientation, disability, age, and gender identity) • Cultural Characteristics and Beliefs (e.g. cultural rituals that inform care, historical experiences, and use of cultural language) • Digital Determinants of Health (e.g. broadband access, urban/rural divide, and digital redlining) • Social Determinants, Social Risks, and Social Needs (e.g. chronic poverty, the physical environment, environmental exposures, and racism) |
|  <p>Health System Characteristics Including factors related to access to and quality, continuity, and affordability of care.</p> | <ul style="list-style-type: none"> • Access to Care (e.g. health insurance coverage, transportation for medical appointments, and supply of providers) • Care Quality (e.g. culturally competent care, provider training in culturally and structurally competent and concordant care) |
|  <p>Health Information Technology Characteristics Referring to the technical characteristics of a digital healthcare solution and characteristics of the data being used and generated by the solution.</p> | <ul style="list-style-type: none"> • Digital Healthcare Technical Design (e.g. timeliness of healthcare solutions that involve digital technologies, user-friendliness and experience, data privacy, data security, and interoperability) • Characteristics of Data (e.g. data accuracy, data transparency, data justice, and ethical concerns) |

Figure 2. Domains and Subdomains of the Evidence- and Consensus-Based Digital Healthcare Equity Framework.

The framework is structured around the digital healthcare lifecycle (**Figure 3**), which is based on the process used in technology development. This lifecycle aligns with quality improvement approaches, such as the “Deming Wheel” and the Institute for Healthcare Improvement’s model of “Plan, Do, Study, Act,” and includes the following phases: Planning, Development, Acquisition, Implementation/Maintenance, and Monitoring/Improvement/Equity Assessment.^{9,10}

Stakeholders and their roles in the digital healthcare lifecycle should be considered in developing healthcare solutions that intentionally consider equity. While the users of the framework are most likely to be digital healthcare developers and vendors, health systems, health plans, and clinical providers, other key stakeholders (e.g., patients/caregivers) are important collaborators in improving health equity.

An intentional approach to considering equity throughout the digital healthcare lifecycle aims to promote improvement in clinical outcomes (e.g., mortality, morbidity, and health/quality of life), process outcomes (e.g., care continuity, care coordination, and care quality), and healthcare experiences (e.g., patient satisfaction/engagement and provider satisfaction/engagement). It also seeks to achieve equitable access to and equity in the quality of healthcare solutions involving digital technologies.

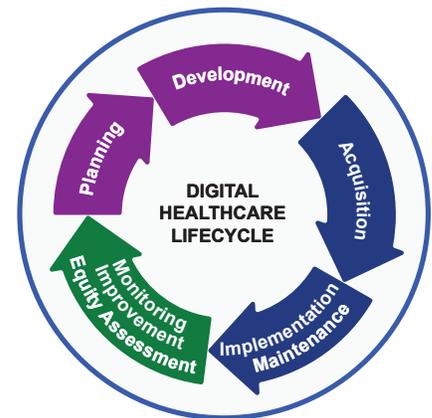


Figure 3. Five Phases of the Digital Healthcare Lifecycle.

ENGAGING STAKEHOLDERS

In addition to users of the framework, other key stakeholders that need to be involved in this work include patients and patient advocates, families and caregivers, community champions, policymakers, and public entities.

Implementing the Framework

GENERAL RECOMMENDATIONS FOR GETTING STARTED

Any transformational change depends on strong leadership, organizational readiness, and ongoing systems support.¹¹ Accordingly, here are five general recommendations that organizations using the framework should adopt to start on the path toward equity intentionality in digital healthcare solutions:

1. Assess Your Organizational Readiness¹²⁻¹⁴

Perform an organization self-assessment of your readiness to start implementing the framework. The assessment should focus on 1) change management capabilities; 2) economic assessments, including costs and the potential return on investment related to equity intentionality; 3) health IT and data capabilities; and 4) leadership commitment to improving health equity.

2. Identify an Equity Champion¹⁵⁻¹⁷

Identify an equity champion to help bring an equity lens to ongoing efforts to plan, develop, acquire, implement/maintain, and monitor/improve/perform equity assessment for healthcare solutions that involve digital technologies. The equity champion can help develop a business model and assess the economic sustainability and impact of the equity intentionality approach, which will help leadership systematically consider equity in long-term planning and resource allocation.

3. Develop a Diverse Workforce^{18,19}

Develop a diverse workforce capable of offering their lived experiences to ensure equity intentionality at an organizational level and for specific projects.

4. Build In Equity Assessments and Feedback Loops^{20,21}

Ensure that equity assessments and feedback loops are built in to processes related to healthcare solutions that involve digital technologies. The feedback loops should continuously assess and improve equity intentionality in healthcare solutions to achieve predefined success.

5. Track Whether Equity is Achieved^{22,23}

Track equity as part of your organizational metrics. For example, develop an equity dashboard to measure equity intentionality in key healthcare solutions that involve digital technologies during key phases of the digital healthcare lifecycle.

Using The Guide

This guide is designed to provide a clear, step-by-step path for specific users, including digital healthcare developers and vendors, health systems, health plans, and clinical providers, who want to implement the [Evidence- and Consensus-Based Digital Healthcare Equity Framework](#).

The guide is divided into sections based on the phases of the Digital Healthcare Lifecycle and the corresponding user groups:

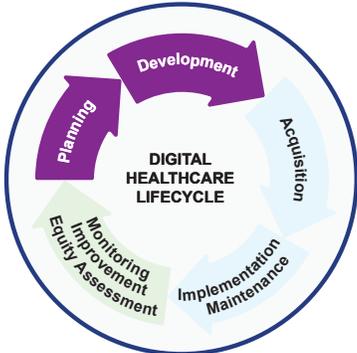
1. Digital Healthcare Developers and Vendors: Planning and Development Phases
2. Health Systems, Health Plans, and Clinical Providers: Acquisition and Implementation/Maintenance Phases
3. Health Systems, Health Plans, and Clinical Providers: Monitoring/Improvement/Equity Assessment Phase

For each phase and the associated user group(s), the guide offers a Checklist of Steps for implementing the [Evidence- and Consensus-Based Digital Healthcare Equity Framework](#). Users can click on a step to be directed to real-world examples that further illustrate aspects associated with a particular step, as well as the characteristics of the domains and subdomains. The guide also offers suggestions on other stakeholders to involve. Users can select Other Stakeholders to access more information on engaging them and how to do so effectively for each phase.

By following this guide, users can take deliberate actions to promote digital healthcare equity.

Steps for Digital Healthcare Developers and Vendors

FOCUSING ON THE PLANNING AND DEVELOPMENT PHASES OF THE DIGITAL HEALTHCARE LIFECYCLE



Checklist Of Steps for Digital Healthcare Developers And Vendors:

Select each step for additional information and real-world examples

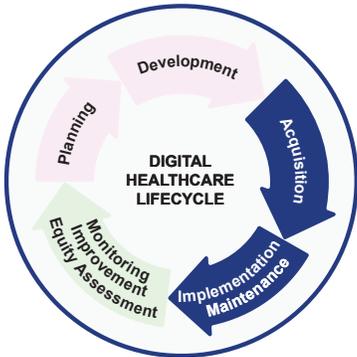
- ✓ [Identify and engage potential users of the digital healthcare solution, particularly those in historically marginalized demographic groups, to ensure it will meet the needs of the intended audience.](#)
- ✓ [Understand the cultural characteristics and beliefs of the communities for which a digital healthcare solution is proposed to identify potential barriers to using the proposed solution.](#)
- ✓ [Consider the impact of the proposed solution on digital equity in access, quality, and continuity of care in distinct healthcare settings.](#)
- ✓ [Assess whether the proposed solution serves as a facilitator \(versus a barrier\) to accessing and receiving high-quality care.](#)
- ✓ [Assess the technical characteristics of the proposed solution and whether those meet the current needs of potential users.](#)
- ✓ [Ensure that data are used equitably and transparently during the creation of a proposed solution and when a solution is capturing, generating, or transmitting data.](#)

OTHER STAKEHOLDERS TO ENGAGE

| Who to Engage? | How Might You Engage Them? |
|--|--|
| Patients/Caregivers, Patient Advocates, and Community Champions | <ul style="list-style-type: none"> • Collaborate with relevant patient and community organizations to learn about their needs, goals, or potential challenges regarding the proposed digital healthcare solution. |
| Health Systems, Clinical Providers, Purchasers, Health Plans, and Public Health Entities (e.g., Public Health Departments) | <ul style="list-style-type: none"> • Seek information on their digital and clinical workflows in a variety of different settings to ensure the successful development and implementation of the digital healthcare solution. • Seek information related to the reimbursement of any new services provided by the proposed solutions. |
| Policymakers | <ul style="list-style-type: none"> • Set up regular roundtable discussions with policymakers to share challenges related to the structural barriers in providing healthcare solutions involving digital technologies, and suggest potential policies that could address those barriers. |

Steps for Health Systems, Health Plans, and Clinical Providers

FOCUSING ON THE ACQUISITION AND IMPLEMENTATION/ MAINTENANCE PHASES OF THE DIGITAL HEALTHCARE LIFECYCLE



Checklist Of Steps For Health Systems, Health Plans, And Clinical Providers:

Select each step for additional information and real-world examples.

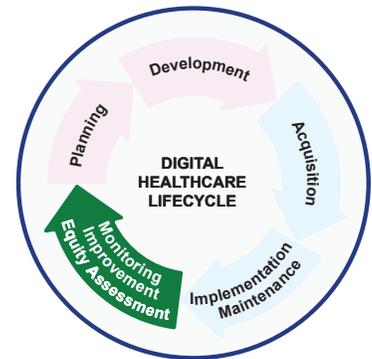
- ✓ [Adopt a digital inclusion-informed strategy regarding the acquisition, implementation, and maintenance of healthcare solutions that involve digital technologies to reduce and eliminate barriers.](#)
- ✓ [Consider a participatory and multisectoral collaboration for proper acquisition, implementation, and maintenance of healthcare solutions that involve digital technologies.](#)
- ✓ [Consider the impact of the implemented solution on digital equity \(access to and quality of care, and care continuity\) across different types of health systems.](#)
- ✓ [Adopt strategies that guarantee a new healthcare solution involving digital technologies serves as a facilitator and not as a barrier to accessing and receiving high-quality care.](#)
- ✓ [Assess the technical characteristics of the solution and how those match the current needs of potential users.](#)
- ✓ [Before acquiring a healthcare solution, consider how it was developed, where and how it will be implemented and maintained, and how it will use, produce, or transmit data.](#)

OTHER STAKEHOLDERS TO ENGAGE

| Who to Engage? | How Might You Engage Them? |
|---|--|
| Patients/Caregivers, Patient Advocates, and Community Champions | <ul style="list-style-type: none"> • Collaborate with patient advocacy organizations and learn about their needs, goals, and challenges. Prioritize organizations that represent populations that have historically carried a disproportionate burden of health disparities. |
| Digital Healthcare Developers and Vendors | <ul style="list-style-type: none"> • Provide information to developers and vendors on the healthcare system’s digital and clinical workflow at a variety of settings to ensure the successful development and implementation of the digital health solutions. • Provide information related to payer reimbursement of the new services provided by the proposed solutions to help developers and vendors plan for solutions that provide more equitable and high-quality care. |
| Policymakers | <ul style="list-style-type: none"> • Lobby for future regulations and programs that would include metrics that assess the use of digital healthcare solutions by medically underserved communities. • Endorse Federal policies that guide culturally appropriate care. • Encourage policies that expand broadband access. |

Steps for Health Systems, Health Plans, and Clinical Providers

FOCUSING ON THE MONITORING/IMPROVEMENT/EQUITY ASSESSMENT PHASE OF THE DIGITAL HEALTHCARE LIFECYCLE



Checklist Of Steps For Health Systems, Health Plans, And Clinical Providers:

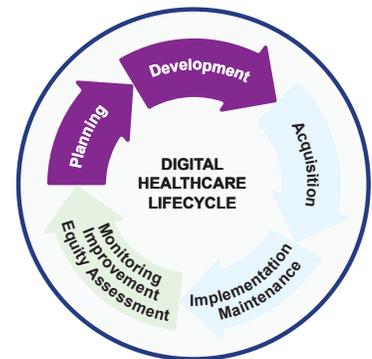
Select each step for additional information and real-world examples.

- ✓ [Identify the characteristics of the populations that are using a healthcare solution that involves digital technologies, and identify populations presently excluded, not benefiting, or not participating at the desired or same rates as others.](#)
- ✓ [Use a participatory approach to collect input from affected community members about the healthcare solutions that involve digital technologies.](#)
- ✓ [Consider the impact of the healthcare solution on digital equity \(access to and quality of care, and care continuity\) across different types of health systems.](#)
- ✓ [Adopt strategies that guarantee a new healthcare solution that involves digital technologies serves as a facilitator, not a barrier, to accessing and receiving high-quality care.](#)
- ✓ [Identify information sources and gaps in available data for a comprehensive monitoring, improvement, and equity assessment of digital technologies.](#)

OTHER STAKEHOLDERS TO ENGAGE

| Who to Engage? | How Might You Engage Them? |
|---|--|
| Patients/Caregivers, Patient Advocates, and Community Champions | <ul style="list-style-type: none"> • Collaborate with patient advocacy organizations and learn about their needs, goals, and challenges. Prioritize organizations that represent populations that have historically carried a disproportionate burden of health disparities. |
| Digital Healthcare Developers and Vendors | <ul style="list-style-type: none"> • Provide information to developers and vendors on the healthcare system's digital and clinical workflow at a variety of different settings to ensure the successful development and implementation of the digital health solutions. • Provide information related to payer reimbursement of the new services provided by the proposed solutions to help developers and vendors plan for solutions that provide more equitable and high-quality care. |
| Policymakers | <ul style="list-style-type: none"> • Lobby for future regulations and programs that would include metrics that assess the use of digital healthcare solutions by medically underserved communities. • Endorse Federal policies that guide culturally appropriate care. • Encourage policies that expand broadband access. |

Key Steps and Associated Real-World Examples for Digital Healthcare Developers* and Vendors



FOCUSING ON THE PLANNING AND DEVELOPMENT PHASES OF THE DIGITAL HEALTHCARE LIFECYCLE

*Digital Healthcare Developers could include Health Systems, Health Plans, and Clinical Providers.

✓ STEP #1

Identify and engage potential users of the digital healthcare solution, particularly those in historically marginalized demographic groups, to ensure it will meet the needs of the intended audience.

Each stage of the technology planning and development process represents an opportunity to intentionally address equity, including developing requirement specifications, design descriptions, and test plans. Developers and vendors are encouraged to employ principles of user-centered design, engaging potential users of the proposed solution.

Equity-related factors to consider in the planning and development phases include age, gender, race, ethnicity, primary language, sexual orientation, gender identity, socioeconomic characteristics, digital access, and digital literacy. For example, technology products should not assume cisgender identifiers and should allow for individuals to identify their gender, as appropriate.

One often-overlooked factor is functional disability status, which could be included as a voluntary self-identified demographic factor, including when/how the disability occurred. Just as other demographic factors impact beliefs and attitudes toward healthcare solutions that involve digital technologies, when someone acquired a disability, how long someone has experienced a disability, and the type of disability can affect those attitudes.²⁴

REAL-WORLD EXAMPLES



Assess digital literacy among elderly patients using a survey, such as the eHealth Literacy Scale (eHEALS) tool, for a solution targeting specific patient populations.²⁵

Having a clear understanding of an audience's digital literacy levels will help inform the design of a solution. For example, during the COVID-19 pandemic, there was a preponderance

of Bluetooth-based digital healthcare solutions when the highest burden of the disease was on elderly populations who were less likely to be aware of or comfortable with this functionality. This resulted in a mismatch between the demographic and digital literacy characteristics of the users with the available technology.

Domain: Patient and Community Characteristics; Subdomain: Digital Determinants of Health



Assure the digital healthcare solutions accommodate the needs of patients with disabilities and those who are developing disabilities. Accordingly, consider proper font and color for the interface to accommodate visual impairment and employ voice-activated technology to accommodate hearing impairment.²⁶

Domain: Patient and Community Characteristics; Subdomain: Sociodemographic Characteristics

✓ STEP #2

Understand the cultural characteristics and beliefs of the communities for which a digital healthcare solution is proposed to identify potential barriers to using the proposed solution.

Identifying and collaborating with trusted partners in the community helps both to assess the digital capacity and infrastructure needs of the community and to understand the ways cultural beliefs in the community might impact the uptake of a solution.²⁷

REAL-WORLD EXAMPLES



Find opportunities to sit down with community members to understand their beliefs and lived experiences. For example, in designing a mobile application for African American men to connect with mental health services, you might hold roundtables with African American men to better understand how historical racism and mistreatment influence their trust of the U.S. healthcare system and their willingness to use a healthcare solution that requires the potential disclosure of sensitive information.^{28,29}

Domain: Patient and Community Characteristics; Subdomain: Cultural Characteristics and Beliefs



Build trust by investing in community partnerships that engage racial and ethnic groups with a disproportionate burden of health disparities. Investments for community engagement could include providing financial incentives for community-based

organizations to collaborate with the developers during the planning and development of a digital healthcare solution. Engaging people from minority groups, such as African American adults and bilingual or Spanish-speaking Hispanic adults, in the designing process through community partnerships creates a “chain of trust” that helps potential users feel comfortable with the product.³⁰

Domain: Patient and Community Characteristics; Subdomain: Sociodemographic Characteristics

✓ STEP #3

Consider the impact of the proposed solution on digital equity in access, quality, and continuity of care in distinct healthcare settings.

Work with representatives of the health systems for which the solution is planned to be implemented, and map the clinical workflows. Digital healthcare solutions rarely follow analog workflows and can disrupt familiar clinical workflows. Thus, it is important to map workflows to identify where a digital solution is relevant and what strategies are needed to support change management for patients and providers.

REAL-WORLD EXAMPLES



Enable a new solution for remote patient monitoring to make use of cellular instead of Bluetooth connectivity so that the solution does not require Wi-Fi and assures wide access across different communities.²⁴

Domain: Health Information Technology Characteristics; Subdomain: Digital Healthcare Technical Design



Design patient-facing digital technologies and software to be used by multiple people/devices under one account to ensure wide access and to create interdependence between users and developers.²⁴

Domain: Health Information Technology Characteristics; Subdomain: Digital Healthcare Technical Design

✓ STEP #4

Assess whether the proposed solution serves as a facilitator (versus a barrier) to accessing and receiving high-quality care.

Hold roundtable discussions with different stakeholders and perform a root cause analysis of potential factors that could contribute to inequitable health outcomes that the proposed solution seeks to solve. Be proactive in thinking about what barriers the proposed solution might create for some subgroups of patients to access and receive high-quality care.

REAL-WORLD EXAMPLES



In developing a website that allows patients to sign up for vaccinations, hold discussions with patients, policymakers, and clinical providers to determine which patient subpopulations would experience improved access to high-quality care from the solution and which populations would experience additional barriers to quality healthcare.

Domain: Health System Characteristics; Subdomains: Access to Care and Care Quality



To prevent implicit bias in the healthcare system affecting access to and use of a new solution, develop opt-out enrollment processes for eligible patients to remove dependence on clinician referral.²⁴

Domain: Health System Characteristics; Subdomain: Access to Care



Data transparency can improve the quality of care. For a more transparent process, incorporate data analysis and interpretation tools in the patient-user interface of digital technologies to empower patients and caregivers to be more active in managing their personal health and healthcare.¹⁰

Domain: Health Information Technology Characteristics; Subdomain: Characteristics of Data



To ensure widespread access, develop products and business models that target both safety net health systems and academic early adopters.³¹ An example of this is how OCHIN, a national network of community health organizations, has tailored electronic health record-based tools to help streamline digital and clinical workflows for community health centers.

Domain: Health System Characteristics; Subdomain: Access to Care



To ensure risk-prediction models are not biased toward people with disabilities, be cautious about ableism inherent in many standardized measures of health. Embedded systemic ableism affects how people with disabilities receive medical equipment, such as receiving ventilators during the COVID-19 pandemic. During the pandemic, anticipated shortages in medical equipment such as ventilators led many States to draft or update their existing

plans for crisis standards of care. The use of certain scoring systems that incorporate disability allocation during the eligibility determination process led to a decreased likelihood of individuals with disabilities receiving life-saving medical treatment during periods of limited availability.³²

Domain: Health System Characteristics; Subdomain: Access to Care



Test medical devices on different subpopulations of patients to ensure that racial and ethnic variations do not result in the malfunction of medical devices and subsequently alter the medical care provided to those patients. For instance, pulse oximeters are racially biased and work less accurately on dark-skinned populations because melanin interferes with light-based pulse oxygen measurements. This bias may result in the provider missing hypoxemia events for dark-skinned patients.³³

Domain: Health System Characteristics; Subdomain: Care Quality

✓ **STEP #5:**

Assess the technical characteristics of the proposed solution and whether those meet the current needs of potential users.

Implement proper methodologies, such as agile methodology,³⁴ to ensure cycles of planning/development are accompanied by seeking feedback from potential users of the proposed solution. Such approaches result in incremental deliverables and dynamic flexibility as the solution matures, helping ensure the solution's technical characteristics consider the needs of the users.

REAL-WORLD EXAMPLES



The developer of patient-facing healthcare solutions may design multilingual interfaces to address the needs of diverse patient populations.²⁴

Domain: Health System Characteristics; Subdomain: Access to Care



The developers may ensure that a new digital healthcare solution is compatible with other devices, offer translation extensions and plugins for digital health information and services, and offer multilingual and multimodal support that considers different levels of digital literacy.¹⁸

Domain: Health System Characteristics; Subdomain: Access to Care

Domain: Health Information Technology Characteristics; Subdomain: Digital Healthcare Technical Design

✓ **STEP #6**

Ensure that data are used equitably and transparently during the creation of a proposed solution and when a solution is capturing, generating, or transmitting data.

It is important to ensure datasets used to create, train, or test a proposed solution adequately represent the characteristics of the patient population (e.g., race, sexual orientation, gender) for which it was developed. Being transparent with users that are implementing or using a solution about what and how data were used to develop, train, or test a solution is equally important.³⁵

Develop policies, procedures, and controls that take patient privacy into account by ensuring data captured, generated, or transmitted by a solution are accurate, transparent, secure, and interoperable. Regular review of privacy protocols and content in close collaboration with a representative sample of users will help developers to iterate the policies and protocols as needed to maximize privacy and control by all users.²⁴

REAL-WORLD EXAMPLES



To build interest and trust among patients, a technology vendor planning and developing a remote patient monitoring solution may allow patients to actively approve all data transmitted to clinicians.³⁶

Domain: Health Information Technology Characteristics; Subdomain: Characteristics of Data



Technology vendors may engage in Health Level Seven (HL7 community forums; a set of international standards for the transfer of clinical and administrative data between software applications used by various healthcare providers) to: 1) lobby for the inclusion of data on social needs and social determinants of health in Fast Healthcare Interoperability Resources standards (FHIR; a standard used to access and exchange healthcare data) and 2) participate and keep up to date with those standards.¹⁰

Domain: Health Information Technology Characteristics; Subdomain: Characteristics of Data

ENGAGING OTHER STAKEHOLDERS

Patients/Caregivers, Patient Advocates, and Community Champions

Although digital healthcare developers and vendors are typically the main stakeholders involved in the planning and development phase of the digital healthcare solution, vendors may be secondary in some contexts, such as when working with a government agency, health system, or clinicians

developing an in-house digital technology. Regardless of the stakeholders initiating the process, input from patients, caregivers, and community will be essential to ensure that the final solution produces optimal improvements in health and will require the willing involvement of patients and caregivers and appropriate community members to share their needs, goals, and challenges. These relationships are multidirectional among all parties. Patient advocacy organizations (e.g., the American Cancer Society) are useful avenues for patients and their caregivers to connect with digital healthcare developers and vendors for relationship-building.

Health Systems, Clinical Providers, Purchasers, Health Plans, and Public Entities (e.g., Public Health Departments)

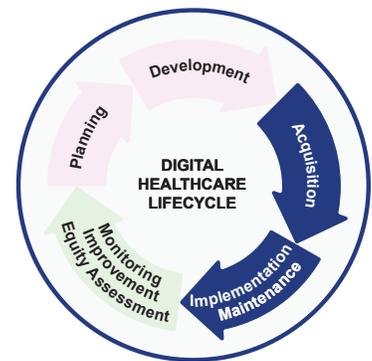
Digital healthcare developers and vendors should engage with the health systems, health plans, and clinical providers during the early stages of planning. Understanding how a proposed technology solution impacts the digital and clinical workflow in different settings would enable successful implementation of the proposed solution. Also, understanding reimbursement and interorganizational considerations related to newly digitized services will help ensure implemented final digital solutions are equitable, efficient, and high value.

Policymakers

Digital healthcare developers and vendors may identify policy or regulatory barriers as part of their planning and development work to be addressed by those in the public sector. For example, if an organization is looking to implement a mobile health application in a community with limited broadband access, policymakers might be the best stakeholder to address that barrier. Digital healthcare developers and vendors are encouraged to set up regular roundtable discussions with policymakers and other stakeholders to share the structural barriers faced in providing healthcare solutions involving digital technologies.³⁷

Key Steps and Associated Real-World Examples for Health Systems, Health Plans, and Clinical Providers

FOCUSING ON THE ACQUISITION AND IMPLEMENTATION/ MAINTENANCE PHASES OF THE DIGITAL HEALTHCARE LIFECYCLE



✓ STEP #1

Adopt a digital inclusion-informed strategy regarding the acquisition, implementation, and maintenance of healthcare solutions that involve digital technologies to reduce and eliminate barriers.

Adopting a digital inclusion-informed strategy helps the health systems, health plans, and clinical providers recognize their community’s sociodemographic, social, and digital determinants of health. It also helps provide proper support to their patients in their initial implementation and sustained maintenance or use of healthcare solutions that involve digital technologies, as well as their monitoring, improvement, and equity assessment. Such intentional strategy and investment in digital equity will help to reduce and eliminate historical, institutional, and structural barriers to access and use healthcare solutions that involve digital technologies.^{11,38,39} Digital inclusion refers to “the activities necessary to ensure that all individuals and communities, including the most disadvantaged, have access to and use of Information and Communication Technologies.”^{11,38}

REAL-WORLD EXAMPLES



Focus on patient training as it relates to security and privacy during the implementation/ maintenance phase to account for varied digital literacy levels.⁴⁰

Domain: Patient and Community Characteristics; Subdomain: Digital Determinants of Health



Assess and be mindful of available and affordable broadband internet services and internet-enabled devices in the communities in which the digital healthcare solution is provided.^{9,23}

Domain: Patient and Community Characteristics; Subdomain: Digital Determinants of Health



Make referrals to available programs such as the Affordable Connectivity Program, an FCC benefit program that helps ensure that households can afford the broadband they need for work, school, and healthcare.⁴¹

Domain: Patient and Community Characteristics; Subdomain: Digital Determinants of Health

✓ STEP #2

Consider a participatory and multisectoral collaboration for the proper acquisition, implementation, and maintenance of healthcare solutions that involve digital technologies.

Identify hard-to-reach patients and develop strategies for multisectoral outreach initiatives.

REAL-WORLD EXAMPLE



During the COVID-19 pandemic, the Pima County Health Department in Tucson, AZ, initiated a campaign on COVID-19 vaccination and other mitigation strategies. They leveraged local data to identify racial and ethnic minority populations at the highest risk for health disparities and low health literacy and populations not currently reached through existing public health campaigns. They identified challenges related to the delivery of information to those with housing issues (e.g., homelessness and housing insecurity and lack of a permanent address). They worked closely with the Department of Housing and Community Development for this outreach.⁴²

Domain: Patient and Community Characteristics; Subdomain: Social Determinants, Social Risks, and Social Needs

✓ STEP #3:

Consider the impact of the implemented solution on digital equity (access to and quality of care, and care continuity) across different types of health systems.

Perform a systematic assessment regarding the impact of healthcare solutions to identify potential factors impacting access to and quality of care affected by the solutions. Additionally, design initiatives to assure equitable access to high-quality and continued care.

REAL-WORLD EXAMPLES



To assure wide access to a new healthcare solution that involves digital technologies, train clinical providers to offer access to all patients, rather than access based on presumed use of the technology, and to encourage patients to use the solution as part of standard care.²⁴

Domain: Health System Characteristics; Subdomain: Access to Care



Provide relevant digital health literacy sensitivity training to clinical providers and health professionals to assist patients in navigating the healthcare solutions that involve digital technologies, and offer tailored solutions specific to their patient's level of digital health literacy.⁴³

Health System Characteristics; Subdomain: Care Quality



Implement digital platforms in different languages as required, and provide digital navigators who will assist the patients in gaining access to and using healthcare solutions that involve digital technologies to assure equitable health quality and continued care.

Domain: Health System Characteristics; Subdomains: Access to Care and Care Quality



Invest in community-based organizations or local partnerships (e.g., libraries) to make devices with the capability for internet or cellular data access freely available in underserved communities (e.g., computers, tablets, smartphones).¹⁰

Domain: Health System Characteristics; Subdomain: Access to Care

✓ **STEP #4**

Adopt strategies that guarantee a new healthcare solution involving digital technologies serves as a facilitator and not as a barrier to accessing and receiving high-quality care.

Partner with community organizations to identify barriers and facilitators to accessing and receiving high-quality care by using healthcare solutions that involve digital technologies. This information would help to adopt strategies that address the barriers and reemphasize the facilitators to equitable and high-quality care.

REAL-WORLD EXAMPLES



Provide continuous quality technical support for patients with different technical skills and levels of eHealth literacy.^{11,38}

Domain: Health System Characteristics; Subdomain: Access to Care



Implement solutions that best accommodate the available digital infrastructure in a community. For instance, in a community where a majority of residents have access to smartphones, but not all can connect through Wi-Fi or a data plan to support video virtual visits or patient self-monitoring devices (such as remote blood pressure monitoring and continuous glucose monitoring), select a remote patient monitoring solution that uses a local cellular network accessible to all individuals with access to a smartphone.⁴⁴ Additionally, using the cellular network for data transmission and social media applications, public health departments in border towns can transmit information across governmental borders without additional cost.

Domain: Patient and Community Characteristics; Subdomain: Digital Determinants of Health

STEP #5:

Assess the technical characteristics of the solution and how those match with the current needs of potential users.

Implement different approaches for seeking feedback from potential users of the solution. Such approaches may result in the incremental implementation of new solutions in existing clinical and digital workflows, helping to ensure the technical characteristics of the solution consider the needs of the users.

REAL-WORLD EXAMPLES



Invest considerable resources into acquiring and integrating technology platforms that connect providers and patients with community-based organizations into the electronic health records, train clinical and administrative staff on new platforms, and ensure that platforms become a routine component of their clinical workflow.⁴⁵

Domain: Health System Characteristics; Subdomain: Access to Care



Invest in and implement patient-facing solutions (e.g., patient portals and mobile health applications) that address the needs of patients from medically underserved communities.⁴⁰

Domain: Patient and Community Characteristics; Subdomain: Social Determinants, Social Risks, and Social Needs



Develop workflows that allow clinical teams to engage with diverse patients across healthcare solutions that involve digital technologies, such as telehealth.²⁵

Domain: Health System Characteristics; Subdomain: Access to Care

STEP #6:

Before acquiring a healthcare solution, consider how it was developed, where and how it will be implemented and maintained, and how it will use, produce, or transmit data.

Some solutions, such as algorithms, can be developed with biased data or modeled on incorrect assumptions.^{35, 46} As a result, outputs from these solutions can perpetuate biases and inequities in care. Therefore, before acquiring a new healthcare solution, consider how it was developed and where and how it will be deployed, monitored, and maintained to address or eliminate the potential for new and emerging biases. Specifically, consider if data were used equitably and transparently in the development of a solution. Prior to implementing a solution, consider the accuracy, security, and interoperability of the data it will capture, generate, and transmit. Review and communicate processes for how a solution will be monitored and maintained once deployed.

Regular review of privacy protocols and content in close collaboration with a representative sample of users is vital. Plan to update policies and protocols as needed to maximize patient privacy and control by all users.³⁶

REAL-WORLD EXAMPLES



Wang et al. developed a bias evaluation checklist that allows model developers and health care providers a means to systematically appraise a model's potential to introduce bias prior to it being developed or deployed.⁴⁷

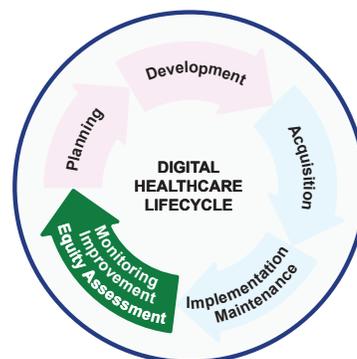
Domain: Health Information Technology Characteristics; Subdomain: Digital Healthcare Technical Design



Pierson et al. implemented a machine learning-based algorithm to measure the severity of osteoarthritis by using knee x-rays to predict pain experienced by patients. This approach dramatically reduced unexplained racial disparities in patient pain, relative to standard measures of severity graded by radiologists. The algorithmic predictions better captured underserved patients' pain.⁴⁸

Domain: Health Information Technology Characteristics; Subdomain: Digital Healthcare Technical Design

Key Steps and Associated Real-World Examples for Health Systems, Health Plans, and Clinical Providers



FOCUSING ON THE MONITORING/IMPROVEMENT/EQUITY ASSESSMENT PHASE OF THE DIGITAL HEALTHCARE LIFECYCLE

✓ STEP #1

Identify the characteristics of the populations that are using a healthcare solution that involves digital technologies and identify populations presently excluded, not benefiting, or not participating at the desired or same rates as others.

Assessing the characteristics of the populations that are affected by the solution helps to identify comparison populations or reference points for monitoring, improvement, and equity assessment. It also helps to identify intersectionality or overlaps of characteristics in ways that expose those populations to relatively greater inequities.⁴⁹

REAL-WORLD EXAMPLE



In 2022, the California Department of Managed Health Care adopted standard health equity and quality measures for health plans to ensure the equitable delivery of high-quality healthcare service for all enrollees. The health plans are now required to stratify reported data by race and ethnicity to demonstrate delivery of equitable quality of healthcare.⁵⁰

Domain: Health Information Technology Characteristics; Subdomain: Characteristics of Data

✓ STEP #2

Use a participatory approach to collect input from affected community members about the healthcare solutions that involve digital technologies.

Identify experts, including former or current solution participants/beneficiaries, members of communities affected by the solution (e.g., patients using a patient portal platform), staff members who work with participants/beneficiaries, or affected communities, subject matter experts such as researchers, or staff in different organizations. Develop a comprehensive process

including different sources of expert input from listening sessions to surveys, interviews, and focus groups by experts in the field or advocacy groups. In this participatory approach, ensure inclusivity for different experts, especially individuals or communities that have historically been excluded or disempowered in decision making.⁴⁹

REAL-WORLD EXAMPLES



Provide different translational services or accommodations for people with disabilities to ensure inclusivity in the process of collecting input from different experts.⁴⁹

Domain: Patient and Community Characteristics; Subdomain: Social Determinants, Social Risks, and Social Needs



Consider different methods of seeking input to accommodate people with different communication preferences or time constraints, or transportation constraints (e.g., a survey or a focus group in person or via Zoom).⁴⁹

Domain: Patient and Community Characteristics; Subdomain: Social Determinants, Social Risks, and Social Needs



Identify strategies to decrease power dynamics and to ensure that experts are comfortable providing candid input to perform a comprehensive monitoring, improvement, and equity assessment.⁴⁹

Domain: Patient and Community Characteristics; Subdomain: Cultural Characteristics and Beliefs



Provide transparency about how input will be shared and used.⁴⁹

Domain: Health Information Technology Characteristics; Subdomain: Characteristics of Data



Use appropriate data-collection methods that center community perspectives and expertise, and report back to community members on how data are used. Community members may want to participate in gathering data about their own community and could provide insights on the best ways to do so.⁵¹

Domain: Health Information Technology Characteristics; Subdomain: Characteristics of Data

✓ STEP #3

Consider the impact of the healthcare solution on digital equity (access to care, quality of care, and care continuity) across different types of health systems.

Continuously assess how the solution impacts access to and quality of care, especially among individuals or communities who have historically been excluded. Design initiatives to assure equitable access to high-quality and continued care.

REAL-WORLD EXAMPLES



Establish long-term partnerships with community organizations with expertise in training community members in digital literacy skills and facilitating connectivity for continued training of community members interested in using the new technology.³⁸

Domain: Health Information Technology Characteristics; Subdomain: Digital Healthcare Technical Design



Advocate for Medicare/Medicaid reimbursement for community health workers to support remote patient monitoring workflows. This effort would ensure the continued use of such solutions for patients with challenges related to access to care.²⁴

Domain: Health System Characteristics; Subdomain: Access to Care

✓ STEP #4

Adopt strategies that guarantee a new healthcare solution that involves digital technologies serves as a facilitator, not a barrier, to accessing and receiving high-quality care.

Partner with experts, including former or current solution participants/beneficiaries and members of communities affected by the solution, and inquire about their views on the benefits and burdens involved in the continued use of the proposed solution. Further, ask for experts' perceptions of barriers to continual use of the solutions and their views on current or potential burdens or barriers that are more severe for certain population groups.

REAL-WORLD EXAMPLES



Partner with experts to identify potential community members who are excluded, are not participating, or are not benefiting from the new solution at desired rates or at the same rates as others.^{11,38}

Domain: Health System Characteristics; Subdomain: Access to Care



Acquire and implement applications and online content to enable and encourage self-sufficiency, participation, and collaboration among those users.^{11,38}

Domain: Health System Characteristics; Subdomain: Access to Care

✓ STEP #5:

Identify information sources and gaps in available data for a comprehensive monitoring, improvement, and equity assessment of digital technologies.

Identify quantitative and qualitative data sources for these processes. Quantitative data, such as survey data, shed light on the magnitude and prevalence of problems related to access and use of solutions, as well as opportunities for improvement. Qualitative data sources, such as an interview or focus group data, increase understanding of context and help to interpret and understand quantitative data.⁴⁹

REAL-WORLD EXAMPLES



Assess whether available data is disaggregated by relevant variables such as race, ethnicity, income, and geographic areas. Such data helps the monitoring and improvement process to include an estimate of the equity impacts of a new healthcare solution that involves digital technologies.⁴⁹

Domain: Health Information Technology Characteristics; Subdomain: Characteristics of Data



Collaborate with a technology developer and vendor of a new solution to develop functionalities for disaggregated data collection among patients who are medically underserved for a comprehensive assessment of the equity impacts of a solution.⁴⁰

Domain: Health Information Technology Characteristics; Subdomain: Characteristics of Data



Carefully assess patterns of missing data from communities. Some patterns of missing data may be due to the community fatigue from continuous assessments and data collections.⁵¹

Domain: Health Information Technology Characteristics; Subdomain: Characteristics of Data



Consider using “Data Walks” as a means of sharing key data and research findings with stakeholders in small groups who interpret the data, and then collaborate to improve the solutions. Using data sharing as a platform for collaboration, a Data Walk can help to ensure a more robust analysis and understanding of the data, inform better policies that address both the strengths and needs of a particular community or population, and inspire individual and collective action among community members.⁵²

Domain: Health Information Technology Characteristics; Subdomain: Characteristics of Data

ENGAGING OTHER STAKEHOLDERS

Patients/Caregivers, Patient Advocates, and Community Champions

Health systems, health plans, and clinical providers should invest in community partnerships as trusted partners in the community as a key approach to engaging minority groups with a disproportionate burden of health disparities. Such relationships would be bidirectional and require efforts from patients, caregivers, and community members. These reciprocal relationships provide opportunities for patients, caregivers, and patient advocacy groups to advocate for the equitable implementation of healthcare solutions that involve digital technologies in their health systems.⁴⁰

Digital Healthcare Developers and Vendors

Health systems, health plans, and clinical providers from a variety of settings, including large urban systems, community health centers, and rural health systems, are encouraged to engage with the digital healthcare developers and vendors from the early stages of planning. Such a relationship helps to promote consideration of digital and clinical workflows at the point of care and helps with consideration of mechanisms for reimbursement and copayments in the planning and development of healthcare solutions involving digital technologies. The result of this early-stage engagement is successful implementation in different settings and more equitable and higher-quality care.

Policymakers

A multifaceted approach to policy is required to ensure equity intentionality in the acquisition, implementation, and maintenance, as well as in the monitoring, improvement, and equity assessment of healthcare solutions that involve digital technologies. To achieve this goal, policymakers and governmental agencies at Federal, State, and local levels play significant roles. Thus, health systems, health plans, and clinical providers need to work with policymakers and

governmental agencies to set future regulations and implementations of Federal programs (e.g., Promoting Interoperability⁵³) to include metrics that assess both the broad use of healthcare solutions involving digital technologies and data on solution use specifically by medically underserved communities. Further, policymakers are encouraged to expand Federal mandates that guide culturally appropriate care to include healthcare solutions that involve digital technologies, such as in Culturally and Linguistically Appropriate Services standards.^{53,54} Lastly, policymakers should enact policies that update broadband access data such as the Federal Communications Commission broadband map⁵⁵ and increase access to broadband through available programs, such as LifeLine Program for Low-Income Consumers.^{53, 56}

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